No.2/78
19Apr78

University of Queensland

PRENTICE COMPUTER CENTRE

MINI/MICRO NEWSLETTER

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1. WORDS FROM THE GURUS

"Software without bugs is software without features."

- Computer Company Employee

"When I use a word it means just what I choose it to mean - neither more nor less."

H. Dumpty in
"Through the Looking Glass"

2. READING PDP11 WRITTEN MAGNETIC TAPES ON THE DEC10

Two programs have been written to read 9-track 800 bpi magnetic tapes written in either DOS-11 or ANSI format. The ANSI format program has successfully read one particular tape written under the RSX-11M operating system but due to the large number of options available in the ANSI format, some modification may be required before other tapes can be read. Further details are available from Arthur Hartwig (extension 3021).

3. PDP11 PASCAL

The Centre recently obtained two PASCAL compilers for PDP11s running the RSX-11M operating system. As yet, we have had no opportunity to try them but do have copies of the documentation files. These may be read at the Centre or borrowed overnight by asking Bryan Claire (extension 3938) or Arthur Hartwig (extension 3021).

4. PDP11 USERS GROUP

At the instigation of Mr. A.W. Coulter, Director of the Prentice Computer Centre, a group of interested persons have been meeting to investigate the feasibility of forming a mini-computer (mainly PDP11) users group.

As a result, the group has decided that such a users group is not only feasible but desirable. A tentative constitution has been drawn up which sets out the aims, membership and control of such a group.

An inaugural meeting of all those who would qualify for membership and would like to participate has been called for -

Date:	16 May, 1978
Time:	2 p.m.
Place:	Room 214, 2nd Floor, Hawken Building.

The function of this meeting will be to -

(1) form such a users group officially;

(2) adopt a constitution;

(3) elect an executive for 1978.

Further details about the proposed users group are available from:

John Fairbairn
Griffith University Phone: 275 7173 or 88 7173

Enquiries can also be directed to -

The Secretary,
Prentice Computer Centre Extension 3018

who will pass the query along to John.

The provisional committee -

Ron Barham	-	Electrical Engineering
George Cooper	-	Physics
John Fairbairn	-	Griffith University
Ron Farmer	-	Chemistry
Arthur Hartwig	-	Prentice Computer Centre
Alistair Henderson	-	Computer Science
Col Lythall	-	Prentice Computer Centre
Bob Owen	-	Pharmacy

would like to thank Alan Coulter for his interest and encouragement. Particularly appreciated is availability of Col Lythall and Arthur Hartwig to assist the group in matters relating to PDP11s.

W.R. Owen

5 PDP11 USERS GROUP CONSTITUTION

1.0 AIMS

1) To promote communication amongst users of PDP11 computers and between users and such bodies as the Prentice Computer Centre, computer manufacturers and other user groups.

2) To establish and maintain an accessible library of useful software and hardware information.

3) To act on behalf of users on common problems.

2.0 USERS GROUP

The users group shall consist of one representative from each department or division of the University of Queensland and Griffith University operating a minicomputer which is substantially related to University operations. The executive may from time to time invite other interested persons to participate in the users group.

3.0 EXECUTIVE

1) The executive shall consist of a Chairman, a Secretary, one nominee from the Prentice Computer Centre and three other members.

2) The Chairman, Secretary and three others will be elected annually from the Users Group at an Annual General Meeting.

4.0 MEETINGS

1) An annual general meeting will be held early in the first semester of each year to elect a new executive.

2) The Committee and executive will meet regularly.

3) The executive may arrange other meetings and activities for all members to further the aims of the group.

5.0 PUBLICATIONS

The executive will arrange for information to be published in the Prentice Computer Centre Newsletter or by other means as appropriate.

6. ARRAY PROCESSING

Ross Gayler of the Psychology Department (extension 3226) recently acquired some literature describing the Floating Point Systems AP-120B array processor. Those interested in further details should contact Ross. (Array processors are high speed arithmetic units particularly suited to processing vector or matrix data and have application in many areas including image processing, simulation, digital filters).

7. PDP11 FORTRAN BUGS

The following bugs have been reported to be present in RT11 Fortran V2. They may also be present in RSX Fortran.

1) Extra characters following an END statement results in the compiler trapping without an error notification.

2) "End of line" comments with characters after column 73 generate "I" errors and cause termination of statement compilation.

3) The "ERR=" option when used with an OPEN statement does not trap errors when they occur.

4) The standalone RT-11 I/O simulator (SIMRT) included in the version 2 kit does work for the inline code option.

5) ENCODE/DECODE does not work for the threaded code option. ENCODE/DECODE does work for the inline code option.

6) PROGRAM statements in the same module as IMPLICIT statements cause an erroneous warning to be generated.

7) Raising a complex number to a negative integer power produces an incorrect result.

8) In threaded mode BLOCK DATA generates bad object files. This problem does not occur in inline mode.

   Solution - none needed since the current version of the RT and RSTS Linker do not detect the bad object files. Operation of the linkers is as the user would expect with appropriate results. This problem is not currently visible to a user, however, may present a problem with subsequent linker updates.

9) Use of the FIND statement causes undefined results.

10) In some circumstances, programs with statement functions and byte arrays with an odd total number of bytes fail. The problem is corrected by making the total number of bytes an even number.

11) DISPOSE='KEEP' on the CLOSE statement has not been implemented, use DISPOSE='SAVE' instead.

8. EDITOR'S NOTES

This edition of the Mini/Micro Newsletter includes the first user contribution to the newsletter. Thanks, Ross, for taking the effort to describe what you have done.

User contributions to any section of the newsletter will be welcomed, particularly contributions describing minicomputer applications, software developed for minicomputers, or bug reports for systems software.

9. AN EXAMPLE OF MINICOMPUTER USE IN PSYCHOLOGY

The perception of speech sounds is a subject which is currently of interest to psychologists. One procedure which has been used by investigators in this area is the method of selective adaptation. A typical selective adaptation experiment proceeds in three stages. Initially, the characteristics of a range of speech sounds as perceived by the subject are measured. Then the subject is 'selectively adapted' by listening to many repetitions of the one speech sound which has been chosen as the adapting stimulus. The final step is a repetition of the first so that any changes in the perceived characteristics of the set of speech sounds which may have been induced by selective adaptation can be assessed. Thus a selective adaptation experiment requires means for the presentation of speech stimuli and recording the responses of the subject.

During 1977, I wished to conduct a selective adaptation experiment. The stimuli for adaptation and testing were to be a set of sounds with precisely controlled acoustic parameters. Three subject response measures were to be recorded. The subject would decide which of two speech sounds the testing stimulus most closely resembled. The time required to reach this decision was also recorded along with the degree of confidence which the subject expressed in the decision. These requirements were well suited to the use of computers.

Accurate acoustic control of speech sounds is best achieved by means of digital synthesis. This was accomplished by writing a speech sound synthesizer program which was given the acoustic parameters of a sound as input and produced as output a file of numbers representing a time-sampled acoustic waveform. Unfortunately, the INTERDATA minicomputer which was available in the Psychology Department could be programmed only in either its assembly language or a rudimentary, interpretive implementation of FORTRAN. Because of this the synthesizer was implemented on the DECsystem-10. However, the experimental control and data analysis programs were implemented on the INTERDATA minicomputer. The experimental control program used the interrupt system and had constraints on its speed of execution. This program was written in assembly language while the data analysis program was written in interpretive FORTRAN.

The departmental minicomputer is a fairly powerful device with sixteen hardware 16-bit general registers, fifteen of which may be used for indexing. It also has floating point hardware, interrupt hardware, a minimum instruction execution time of one microsecond and 28K of eight bit bytes of core memory addressable as bytes, half-words and full-words. The attached peripherals are -

(1) an ASR33 teletype with paper tape reader and punch,

(2) a high speed paper tape reader and punch,

(3) an eight channel analogue to digital converter,

(4) the processor front panel,

(5) a programmable real-time clock, and

(6) an experimental interface unit.

The experimental interface unit is a set of bidirectional data and status registers which allow other laboratory equipment to be handled as a standard peripheral by the processor.

I decided to use seven sound stimuli each 300 milliseconds long with a sampling rate of ten thousand samples per second. Each sample was stored as an eight bit byte. Thus, twentyone thousand bytes of storage were required for the stimuli. Approximately 1K bytes were used for the experimental control program and the control byte table. The control byte table specified the sequence of test and adaptation stimuli which were presented to the subject. Because so much storage was required and because of the need for fast handling of interrupts from the clock during the output of stimuli, the program was written to run in executive mode with the operating system removed from core.

The stimuli, which were generated on the PDP-10, were punched onto fan-fold paper tape as eight bit image mode bytes by the high speed punch at the Computer Centre. The control byte table was generated on the minicomputer and punched onto tape in image mode. The program, stimuli and control table were then loaded and the core image saved on paper tape so that the experiment could be started with as little effort as possible. Starting up the experiment took approximately five minutes, most of which was spent reconnecting the apparatus to the experimental interface unit. The apparatus consisted of -

(1) a digital to analogue converter driving a pair of headphones,

(2) a pair of switches with which the experimenter could either terminate or temporarily suspend the experiment, and

(3) a hand held box equipped with indicator lights and response buttons.

After initializing itself, the program runs as follows:

The status of the two control switches is sensed. If the termination switch is closed the termination routine is executed following which the program halts at its starting address. Otherwise, if the suspend switch is closed, the program continues to sense the status of the switch until it is opened again. Then an attempt is made to fetch the next control byte from the table. If the table is empty, execution is terminated in the same manner as that caused by the termination switch. If a control byte is fetched, it indicates the next stimulus to be presented and whether it is to be used for adaptation or testing. If the byte indicates adaptation, the subject is informed via the indicator lights.

The adapting stimulus is then presented a given number of times at fixed intervals. After this, the program loops back to the point where the control switches were sensed. If a test trial is to occur, this is shown to the subject by an indicator light. A fixed warning period then elapses before the stimulus is presented. At the end of the warning period, the stimulus output process is initiated. This process is interrupt driven by the real-time clock and the outputs one sample value every 100 microseconds. After the output process is initiated, a light indicates to the subject that responses may be made and sensing of the response buttons commences. Sensing continues for a fixed period after which the response light is extinguished. A further waiting period then follows after which the response and reaction time data are punched onto tape and printed on the teletype. The program then loops back to sense the control switches.

The system was a very convenient and reliable way of conducting the experiment and proved to be totally satisfactory. However, program developments for this application was particularly time-consuming and frustrating because of -

(1) the lack of a high level experimental control language,

(2) the generally low standard of the system software such as the editor,

(3) the unwieldiness of paper tape for mass storage, and

(4) the use of a low speed teletype as the printed output device (an assembly listing usually took 40 minutes to be printed).

For these reasons, I will be particularly glad when the Psychology Department receives its new PDP11/34. I also believe that this newsletter will have a considerable part to play in increasing the efficiency (in terms of programming time) with which micros and minis are utilized. It will do this by removing the necessity for the continued re-invention of the wheel and by documenting those things which never seem to find their way into the official manuals.

Ross Gayler
Psychology Department
Extension 3226

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